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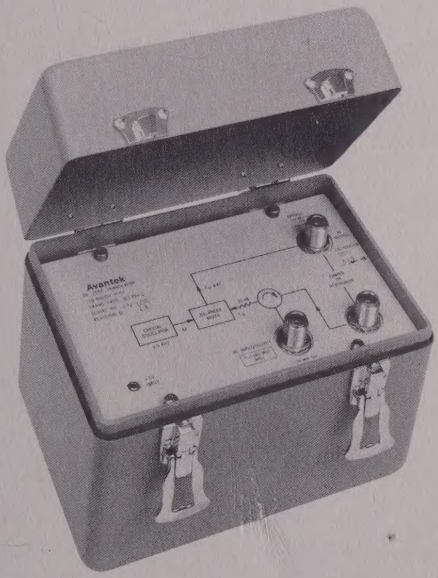

MODEL 6356
RF TEST TRANSLATOR

Operation Manual

DR2TT RF TEST TRANSLATOR

FOR 2 GHz RADIO APPLICATIONS

SITE_____

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DR2TT RF TEST TRANSLATOR

MANUAL INTRODUCTION

This manual describes the operation of the TeleSciences DR2TT Test Translator. The manual details procedures required to operate the Test Translator with the TeleSciences DR2D radio. The general principles, however, can be applied to operate the Test Translator with other TeleSciences 2 GHz digital microwave radios.

Chapter 1 provides an introduction and description of the equipment, including specifications. Chapter 2 discusses how the DR2TT is connected and used for both internal and external offset oscillator operations. Chapter 3 describes the Test Translator's use in a 1 x N configuration, including precautionary measures that must be taken during the set-up procedure for RF loopback.

CONTENTS

Chapter		Page
1.	GENERAL INFORMATION	1-1
	1. General	1-1
	2. Accessories	1-2
	3. Specifications	1-5
2.	OPERATION	2-1
	1. General	2-1
	2. Step 1 — Operating Instructions	2-2
	A. Internal Offset Oscillator	2-2
	B. External Offset Oscillator	2-2
	3. Step 2 — Equipment Connection and Adjustment	2-4
	A. Internal and External Offset Oscillator	2-4
	B. External Offset Oscillator	2-4
	4. AGC Loopback Curve	2-4
	A. Required Equipment	2-5
	B. Recommended Vendor Equipment	2-5
	5. AGC Loopback Curve Set-Up	2-6
	A. Step 1 — Test Translator Set-Up	2-6
	B. Step 2 — Radio Operation	2-6
3.	RF LOOPBACKS IN 1 X N CONFIGURATIONS	3-1
	1. General	3-1
	2. Procedures	3-1
	A. Transmit/Receive Pairs	3-2
	B. Test Translator Set-Up	3-5
	C. Reconnecting	3-5

LIST OF TABLES AND FIGURES

CHAPTER 1 GENERAL INFORMATION

Table 1-A Optional DR2TT Configurations
Table 1-B DR2TT Specifications

Figure 1-1 DR2TT Equipped for Both Internal and External Offset Oscillator Operation
Figure 1-2 Functional Block Diagram of the DR2TT
Figure 1-3 Typical DR2TT Accessory Kit
Figure 1-4 Example of DR2TT with a DR2D Radio in a Single-Cable Loopback
Figure 1-5 Optional DR2TT Accessories

CHAPTER 2 OPERATION

Table 2-A Power Level Adjustments

Figure 2-1 Test Translator Connection for Single-Cable Loopback
Figure 2-2 AGC Loopback Curve Measurement Set-Up

CHAPTER 3 RF LOOPBACKS IN 1 X N CONFIGURATIONS

Table 3-A Primary 1 Switch Positions
Table 3-B Primary 2, 3, 4, or 5 Switch Positions
Table 3-C Standby Switch Positions

Figure 3-1 1 x N Front Control Panel
Figure 3-2 Two-Cable RF Maintenance Loopback for a 1 x N Configuration

CHAPTER 1

DR2TT RF TEST TRANSLATOR

GENERAL INFORMATION

1. GENERAL

1.01 The DR2TT Test Translator (Figure 1-1) provides local RF loopback between a transmitter and receiver pair. Internally, the DR2TT provides 50 MHz offset spacing, or it can be optioned for an external offset frequency input for other spacings.

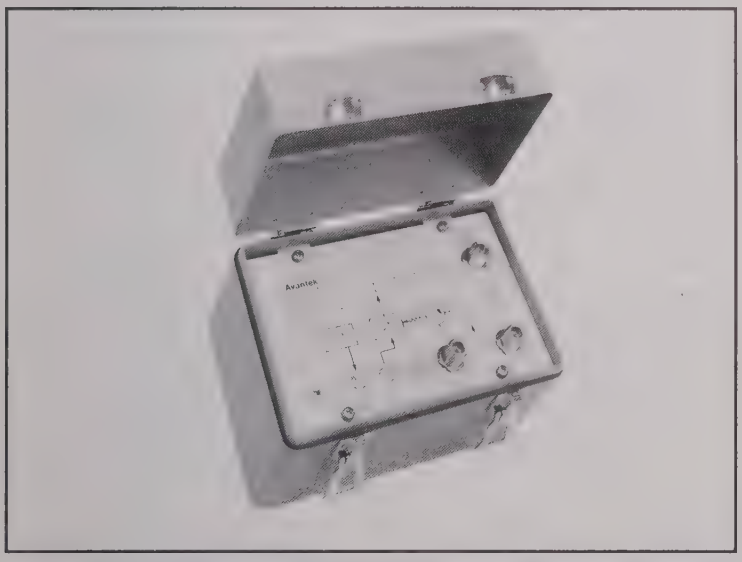

Figure 1-1. DR2TT Equipped for Both Internal and External Offset Oscillator Operations.

1.02 As shown in the block diagram in Figure 1-2, the DR2TT Test Translator takes the transmit power from the antenna port through an attenuator. The Test Translator mixes this signal with either an internal 50 MHz local oscillator (LO) or an external source between 20 and 200 MHz and produces the local receive frequency.

2. ACCESSORIES

2.01 Figure 1-3 is a photograph of a typical DR2TT Accessory Kit. Figure 1-4 shows the Test Translator with a DR2D radio in a single-cable loopback, and the applications of the following accessories:

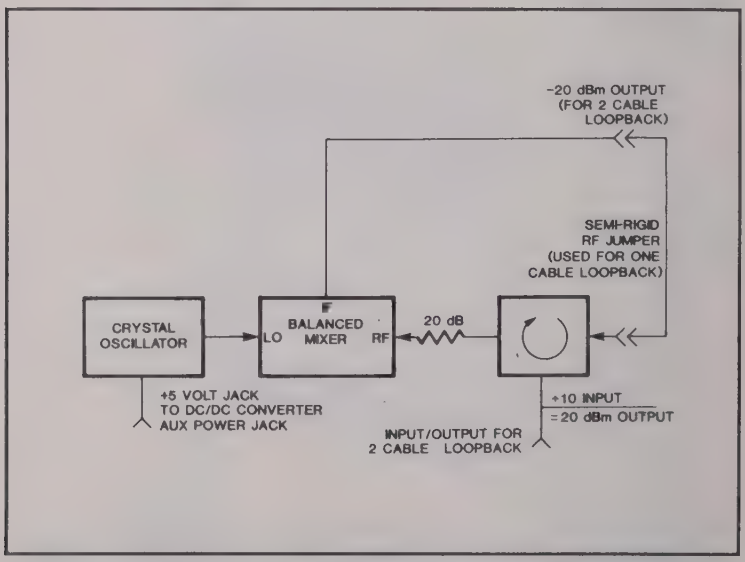

Figure 1-2. Functional Block Diagram of the DR2TT.

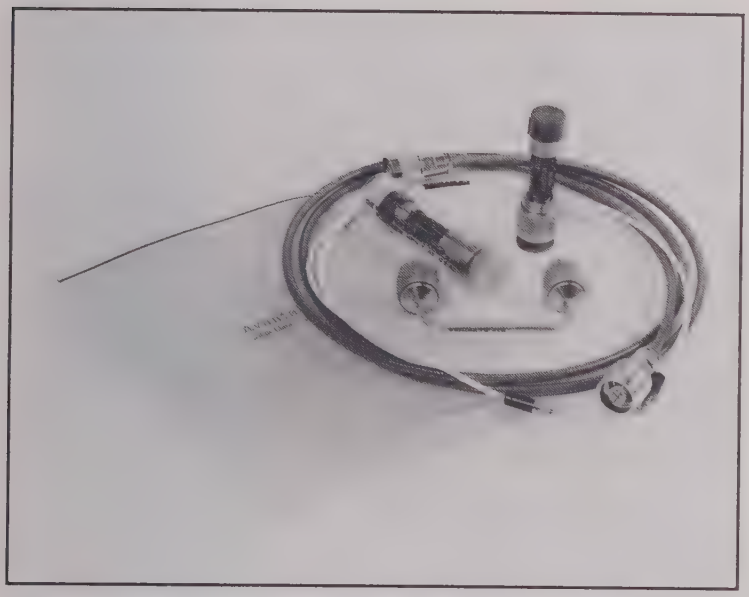

Figure 1-3. Typical DR2TT Accessory Kit.

(1) 5-foot black dc cable (350-020150-001) or 5-foot white dc cable (350-006476-001)

(2) 5-foot RF cable with type N connectors (350-006475-001)

(3) Semi-rigid RF jumper cable (350-006473-001)

(4) 20 dB coaxial attenuator (546-010395-001)

2.02 Though not provided with the DR2TT, the following equipment, shown in Figure 1-5, is also available from TeleSciences:

(1) Loopback test filter (320-013976-100)

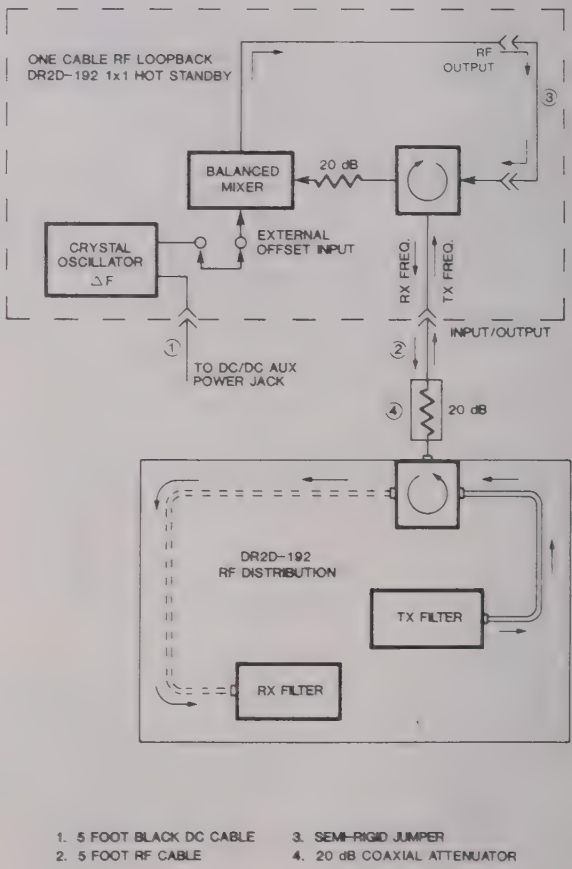

Figure 1-4. Example of DR2TT with a DR2D Radio in a Single-Cable Loopback.

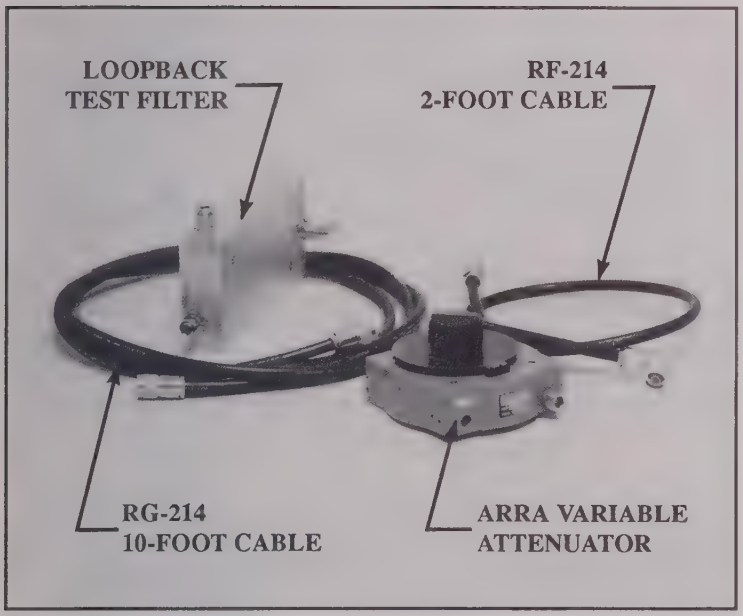

Figure 1-5. Optional DR2TT Accessories.

(2) RG-214 10-foot cable (350-013143-010)

(3) RF-214 2-foot cable (350-013143-002)

(4) ARRA Variable Attenuator (546-070832-001)

2.03 Table 1-A lists the optional configurations available for the DR2TT.

3. SPECIFICATIONS

3.01 Table 1-B lists the specifications for the DR2TT Test Translator.

TABLE 1-A
OPTIONAL DR2TT CONFIGURATIONS

ITEM	PART NUMBER
DR2TT with 50 MHz Internal Oscillator	310-006356-001
DR2TT with 50 MHz Internal Oscillator, External Input	310-006356-010
DR2TT with External Input Only	310-006356-011

TABLE 1-B
DR2TT SPECIFICATIONS

ITEM	SPECIFICATION
RF Band	1.7 to 2.3 GHz
Maximum RF Input	+13 dBm
Insertion Loss	-30 dB
Impedance (Input/Output)	50 ohms
VSWR (Input/Output)	1.25:1
Operating Temperature	0°C to 50°C
RF Connections	Type N Female
Weight	2.9 Kgm (6.5 lbs.)
Dimensions	15.2 X 20.3 X 22.9 cm (6 X 8 X 9 inches)

CHAPTER 2

DR2TT TEST TRANSLATOR

OPERATION

1. GENERAL

1.01 The following procedures describe the DR2TT Test Translator's use for both internal and external offset oscillator operations.

1.02 When used for internal oscillator operation, the DR2TT is simple to set up and operate.

Caution: The use of the DR2TT in the terminal loopback configuration (both two-cable and single-cable loopback) results in the system being off the air for the duration of the test. Any exceptions are in the 1 x N configuration and are noted in Chapter 3 of this manual.

1.03 The following items are required for single cable RF loopback:

- One DR2TT Test Translator
- One RF cable (10 feet)
- One 20 dB attenuator (Narda)
- One RF generator, HP 8656 or equivalent (used only on external offset operations)
- One BNC type cable (used only on external offset operations)

2. STEP 1 — OPERATING INSTRUCTIONS

A. Internal Offset Oscillator

2.01 For internal offset oscillator operation, use the +5 V cable (black or white depending on customer's radio) supplied with the DR2TT. Insert one end into the +5 V input of the DR2TT.

2.02 If the radio used is a DR2D, insert the other end of the +5 V cable into the DR2D's auxiliary jack, located on the front panel of the DC/DC Converter in the Digital Shelf. (Refer to Figure 1-3 in Chapter 1.)

2.03 When a DR2C radio is used, the other end of the +5 V cable should be inserted into the DR2C's +5 V auxiliary jack, which is located on the Meter/Alarm module.

2.04 When a DR2L radio is used, insert the other end of the +5 V cable into the DR2L's auxiliary jack, located on the Power Distribution Panel.

B. External Offset Oscillator

2.05 For applications requiring the use of an external offset oscillator, determine the offset frequency and set the RF frequency generator to that frequency. Adjust the generator for an output power level of +5 dBm ±1 dB. Connect the generator's output to the external input jack of the DR2TT. Figure 2-1 shows the Test Translator connections for single cable loopback.

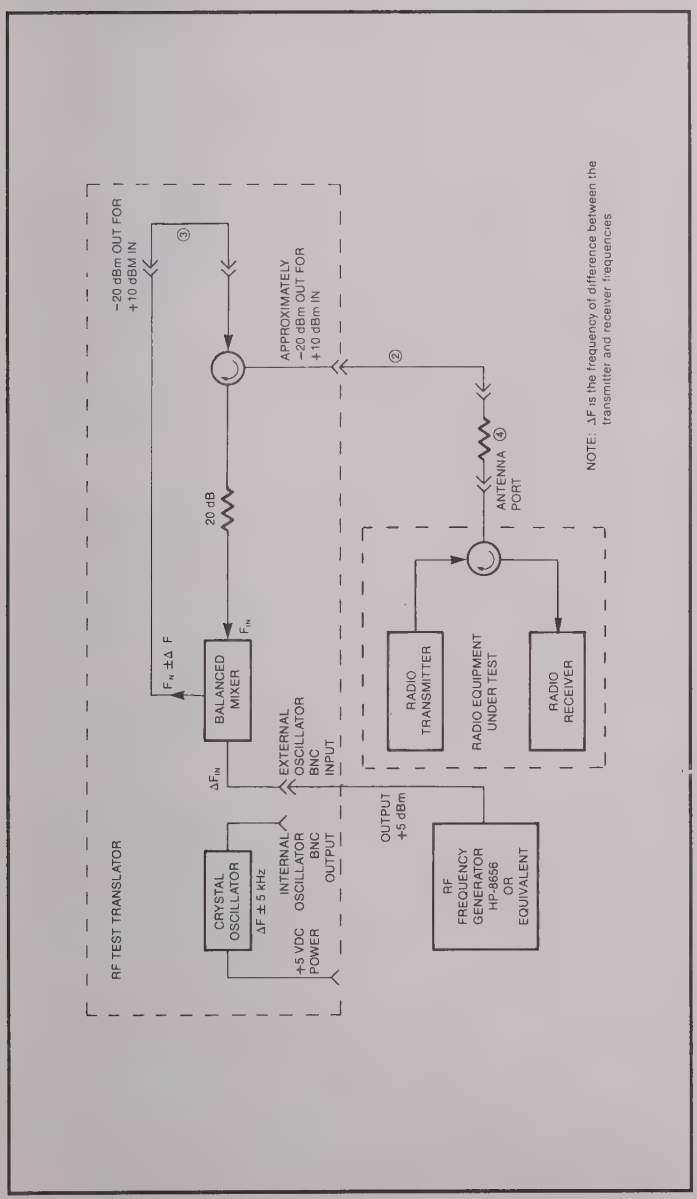

Figure 2-1. Test Translator Connection for Single-Cable Loopback.

3. STEP 2 — EQUIPMENT CONNECTION AND ADJUSTMENT

A. Internal and External Offset Oscillator Operation

3.01 Place a 20 dB attenuator on the antenna port, located at the rear of the RF Distribution Shelf. Connect an RF cable from the 20 dB attenuator to the input/output connector of the DR2TT. (Ensure that the semi-rigid RF jumper cable is installed.) Refer to Figure 1-3 in Chapter 1.

3.02 Once these connections have been made, the receiver should lock to the local transmitter signal.

B. External Offset Oscillator Operation

3.03 In the DR2TT's external operation mode, the receiver should acquire lock. However, the RF signal generation requires fine adjustment, achieved by monitoring the IF output of the Demodulator using a frequency counter.

3.04 Turn the modulation off by pushing the switch located on the Coder front panel to the off position.

3.05 Adjust the RF signal generator for a reading of 70.000 MHz ±200 Hz on the Demodulator. After this is accomplished, switch the modulation back on; the receiver should again acquire lock.

4. AGC LOOPBACK CURVE

4.01 This loopback procedure is used to plot the AGC curve of the local receiver. If the radio is protected, this loopback test can be performed on the off-line transmitter and receiver pair.

Caution: Care must be taken in testing a particular transmitter and receiver pair if the system is carrying traffic.

A. Required Equipment

4.02 The AGC loopback curve measurement requires the following TeleSciences test equipment:

- One Test Translator with Accessory Kit
- Two RG-214 10-foot cables (not provided with the DR2TT)
- Two RG-214 2-foot cables (not provided with the DR2TT), or use one 2-foot cable, and the 5-foot cable provided
- One 20 dB attenuator
- One loopback test filter (not provided with the DR2TT)

B. Recommended Vendor Equipment

4.03 In addition, the following vendor test equipment or equivalent is required:

- SMA to N type, N type to 90° elbow (not provided with the DR2TT)
- One HP435 Power Meter with a range of -20 to -65 dBm
- One HP 8484A High Sensitivity Sensor (low power)

- One TeleSciences 546-070832-001 Variable Attenuator (or ARRA 3-4952-60)

  Note: If the loopback procedure is being performed for maintenance purposes, another 20 dB attenuator may be used instead of the variable attenuator.

5. AGC LOOPBACK CURVE SET-UP

A. Step 1 — Test Translator Set-Up

5.01 Set up the Test Translator as instructed in Section 2 of this chapter.

B. Step 2 — Radio Operation

5.02 Place a 20 dB attenuator (see Figure 2-2) on the antenna port of the radio (located on top of the rack). Connect a 10-foot RF cable from the 20 dB attenuator to the RF input of the Test Translator. (Remove the semi-rigid jumper on the Test Translator.)

5.03 Using the 5-foot cable (found in the Test Translator Accessory Kit), connect the Test Translator port labeled RF OUTPUT at a right angle to the type N connector input of the loopback test filter.

5.04 With a 2-foot RF cable, select the proper port on the test filter for connection to the variable attenuator. (The test filter provides high and low frequency bandpass. The correct band selection is the one that will pass the local receive input frequency.)

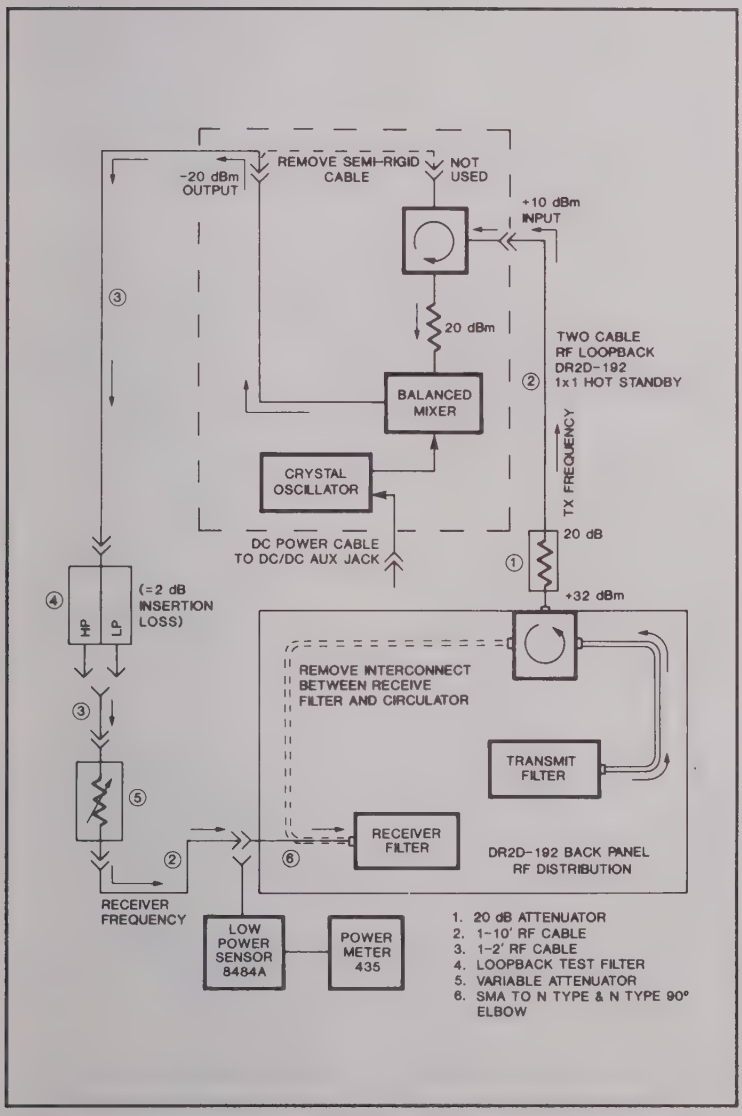

Figure 2-2. AGC Loopback Curve Measurement Set-Up.

5.05 Using the second 10-foot RF cable, connect the other end of the variable attenuator port to a previously calibrated power meter. The power meter should be equipped with a high sensitivity sensor (HP 8484A). Set a reference power level by adjusting the variable attenuator to the correct value as shown in Table 2-A.

TABLE 2-A
POWER LEVEL ADJUSTMENTS

Transmit Output Power			Adjusted Power Meter Reading
DR2D	DR2C	DR2L	
+32.0 dBm	+32 dBm	+31 dBm	-30 dBm
+29.5 dBm	+27 dBm	+27 dBm	-35 dBm
+23.0 dBm	+20 dBm	—	-40 dBm

5.06 The adjusted power meter reading establishes the high received signal level (RSL). Disconnect the power meter and reconnect the 10-foot RF cable to the local receiver filter after removing the interconnect between the circulator and receive filter. (Refer to Figure 2-2.)

NOTE: In DR2C applications, disconnect the power meter and reconnect the 10-foot RF cable to the local receiver (J10). (Refer to Figure 2-3.)

5.07 If the radio used is a DR2D, monitor the AGC voltage at the receiver AGC test points on the Control Panel. Then, in graduated increments, increase the

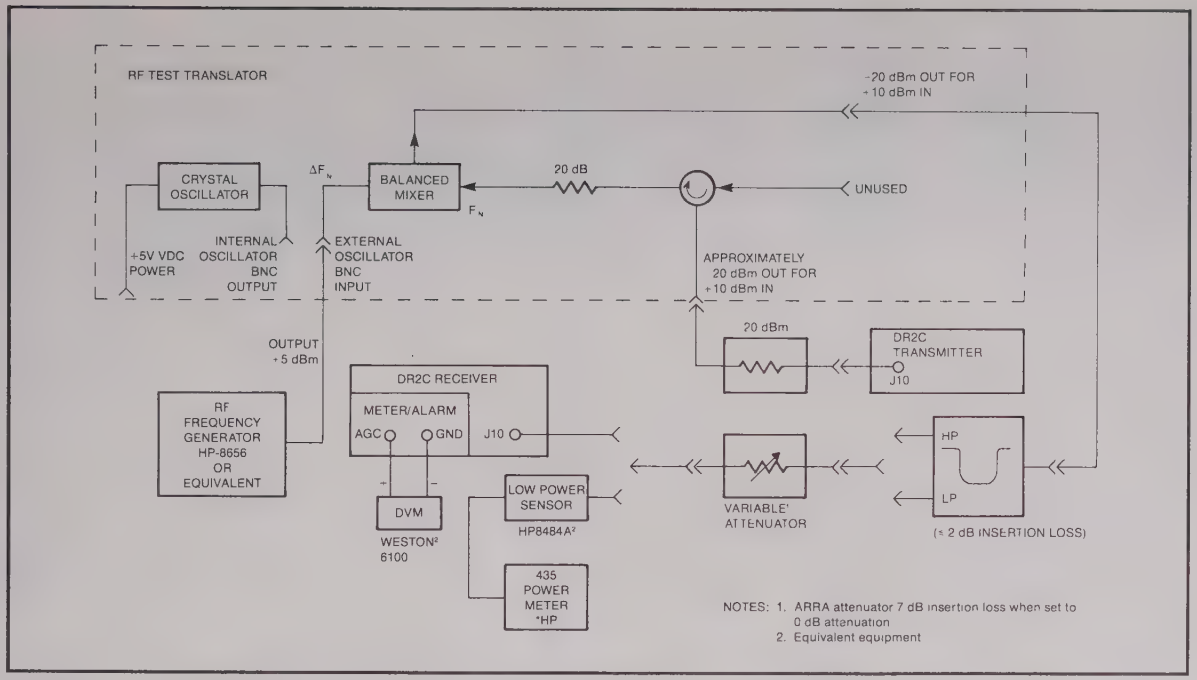

Figure 2-3. DR2C Test Translator Connection for AGC Loopback Curve Measurement (Shown Using External Oscillator).

attenuation, while recording the RSL and the AGC voltage with the Control Panel Display, until the threshold level is reached. (Refer to Figure 2-2.)

5.08 For a DR2C radio, use a digital voltmeter to measure the AGC voltage at the AGC test points located on the Meter/Alarm panel, with the AGC button out on the receiver being tested. (Refer to Figure 2-3.)

5.09 For a DR2L radio, use a digital voltmeter to measure the AGC voltage at the AGC test points located on the Demodulator and Downconverter of the receiver being tested.

6. BER MEASUREMENT

6.01 BER measurements are made to ensure that the radio's bit error rate (BER) is within specification. (See Chapter 1, Specifications.)

CHAPTER 3

DR2TT TEST TRANSLATOR

RF LOOPBACKS IN 1 X N CONFIGURATIONS

1. GENERAL

1.01 As stated in Chapter 2, RF loopbacks in 1 x 1 Hot Standby configurations will cause the system to go off the air for the duration of the test. RF loopbacks in a 1 x N system configuration, however, will not cause loss of traffic, if proper precautionary measures are taken.

1.02 Chapter 3 describes the precautionary measures that must be taken during the set-up procedure for the RF loopback in 1 x N system configurations.

1.03 Any transmit and receive pair can be used for a two-cable loopback without loss of traffic. Different set-up procedures must be followed for each pair.

Caution: The single-cable loopback operation will cause loss of traffic in a 1 x N system.

2. PROCEDURES

2.01 Using the DR2TT Test Translator in the 1 x N configuration involves three basic procedures:

- Setting up whatever transmit/receive pair is used
- Operating the Test Translator
- Reconnecting

A. Transmit/Receive Pairs

Primary 1

2.02 The following steps should be taken when Primary 1 is used for two-cable RF loopback:

(1) Open the controller door and locate the Control Communication (X-Comm) receiver card.

(2) Note the location of TP1 and TP3 on the X-Comm receiver card.

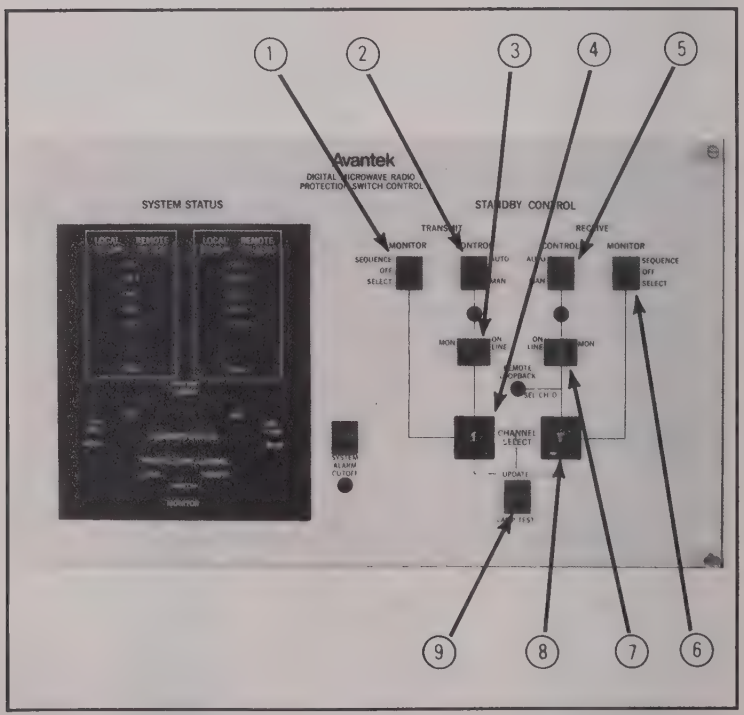

Figure 3-1. 1 x N Front Control Panel.

TABLE 3-A
PRIMARY 1 SWITCH POSITIONS

Transmit		Receive	
Switch	Position	Switch	Position
1 Monitor	Off	5 Monitor	Off
2 Control	Manual	6 Control	Manual
3 On Line/ Monitor	On Line	7 On Line/ Monitor	On Line
4 Channel Select	#1	8 Channel Select	#1
9 Update/ Lamp Test	Update	9 Update/ Lamp Test	Update

Primary 2, 3, 4, or 5

2.03 When Primary 2, 3, 4, or 5 is used, set the front panel controller switches as indicated in Table 3-B. (Refer to Figure 3-1.)

Standby

2.04 Follow these steps when standby is used for the two-cable RF loopback:

(1) Open the controller door and locate the X-Comm receiver card.

TABLE 3-B
PRIMARY 2, 3, 4, OR 5 SWITCH POSITIONS

Receive		Transmit	
Switch	Position	Switch	Position
1 Monitor	Off	5 Monitor	Off
2 Control	Manual	6 Control	Manual
3 On Line/ Monitor	On Line	7 On Line/ Monitor	On Line
4 Channel Select	To desired primary number	8 Channel Select	To desired primary number
9 Update/ Lamp Test	Update	9 Update/ Lamp Test	Update

(2) Note the location of TP2 and TP3 on the X-Comm receiver card.

(3) Jumper TP2 and TP3.

(4) Note the loss of X-Comm standby. (DS3 will turn on when there is a loss of standby X-Comm.)

(5) Set the front panel controller switches as indicated in Table 3-C. (Refer to Figure 3-1.)

TABLE 3-C
STANDBY SWITCH POSITIONS

Transmit		Receive	
Switch	Position	Switch	Position
1 Monitor	Off	5 Monitor	Off
2 Control	Manual	6 Control	Manual
3 On Line/ Monitor	On Line	7 On Line/ Monitor	On Line
4 Channel Select	#0	8 Channel Select	#0
9 Update/ Lamp Test	Update	9 Update/ Lamp Test	Update

B. Test Translator Set-Up

2.05 Set up for two-cable loopback as indicated in Figure 3-2, and operate the Test Translator as instructed in Chapter 2, Sections 2 through 5.

C. Reconnecting

2.06 Upon completion of RF loopback, follow these steps to complete the entire procedure for systems in the 1 x N configuration:

(1) Reconnect all RF connections to the triplexer.

(2) Reposition all controller switches to their previous settings.

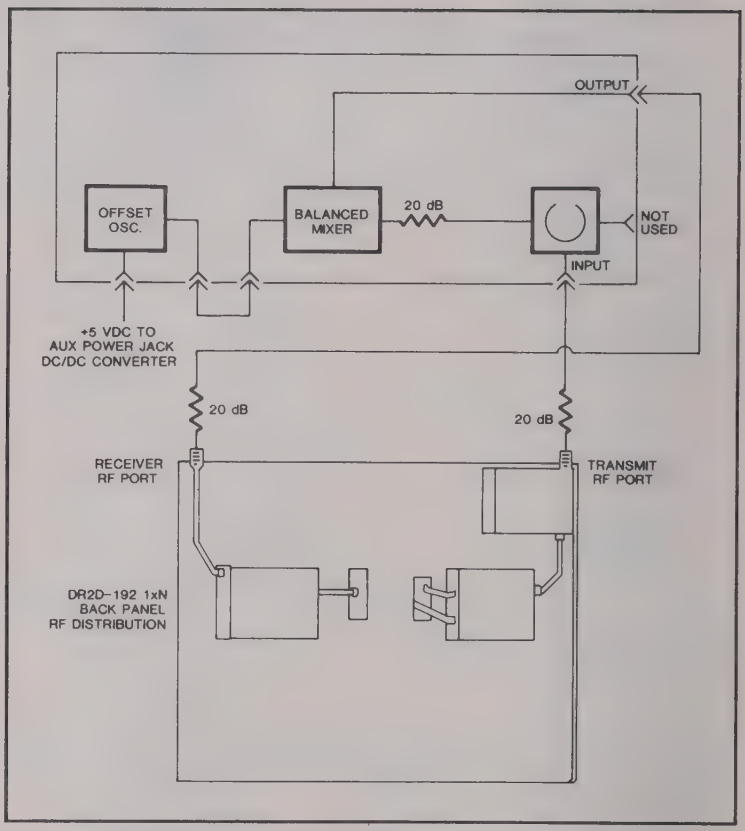

Figure 3-2. Two-Cable RF Maintenance Loopback for a 1 x N Configuration.

(2) Reposition all controller switches to their previous settings.

(3) Remove the jumper on the X-Comm receiver, and verify that DS2 turns off.

(4) Verify normal operation of the 1 x N system.

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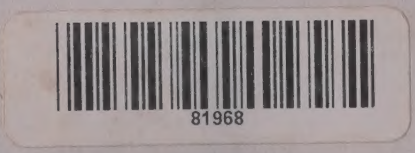

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